

## Remarks

Claims 5 and 8-11 are canceled.

Claim 1 is amended.

Claims 1 and 12-14 are now present in this application.

The present claims are now limited to where the hydroxybenzophenones, the 2-hydroxybenzotriazoles, the 2-hydroxyphenyltriazines and the oxanilides are selected from specific compounds. Support is found on pages 14 and 15 of the specification.

No new matter is added.

## Summary

Prior to discussing the claim rejections, Applicants offers the following summary without prejudice:

It is known that combinations of different classes of light stabilizers, having a different mode of action, may impart a synergistic improvement to certain polymeric substrates, such as for example to thermosetting coatings or thermoplastic polymers.

Typical examples are UV-absorber and sterically hindered amines (HALS), UV-absorbers and Ni-stabilizers, UV-absorbers and phenolic antioxidants and so on.

This is also reflected in the documents cited by the examiner, in which usually a listing of such complementary stabilizers is given (see below).

Prior to the instant invention there was no evidence in the prior art, that synergistic stabilizing effects can be obtained in certain polyolefin substrates, when combinations of equally acting stabilizers (UV-absorber combinations) are used. On the contrary the skilled person was seriously looking for synergistic effects with all possible combinations of differently acting stabilizers.

Synergistic within this context means, that the effect of the combination exceeds the expected effect of the single stabilizers.

It has been the merit of the instant inventor having overcome such prejudice and having realized that unexpectedly in certain polyolefin substrates such synergistic effects occur with specific UV-absorber combinations, which in other respects have the same mode of action, namely absorbing UV light and converting it into harmless radiation.

This effect does not occur generally in all thermoplastic substrates nor with all UV-absorber combinations in all types of polyolefins as is shown in the comparative examples of the instant invention.

Table 3, for example illustrates the effect of a combination of 0.15% Chimassorb<sup>®</sup> 81 (benzophenone) and 0.15% Tinuvin<sup>®</sup> 327 (benzotriazole) in Phillips Type PE-HD. Whereas 0.3% Chimassorb<sup>®</sup> 81 led to an exposure time  $T_{0,1}$  of 2230 hours and 0.3% Tinuvin<sup>®</sup> 327 to 1240 hours, the combination of both at 0.15% concentration each, reaches 3000 hours.

This is a clear synergistic effect, which cannot be deduced from any prior art. In particular not, when taking into account the comparative experiment in a Ziegler Type PE-HD (Table 3a); 0.3% Chimassorb<sup>®</sup> 81 lead to 1540 hours and 0.3% Tinuvin<sup>®</sup> 327 to 700 hours. In contrast to the above Phillips type PE-HD, the combination of both at 0.15% concentration each, reaches only 940 hours, which is below the calculated linear effect of 1120 hours.

**In other words in the PE-HD of the Ziegler Type a clear antagonistic behavior is detected.**

The skilled person starting with the experiment in a Ziegler Type PE-HD would therefore never having expected a different behavior in another PE-HD, such as the Phillips Type. The result in the Phillips Type PE-HD is therefore clearly non-obvious.

The examiner is further requesting the incorporation of a distinguishing feature between a PE-HD manufactured according to the Phillips process and according to the metallocene process.

Besides the differences already mentioned in our Amendment filed September 8, 2003, further different features are summarized in the further enclosed document, which is a copy of "Makromoleküle, Vol. 3, pages 160-163, Editor H. G. Elias, Wiley-VCH Weinheim, New York".

It is known prior art, that Phillips Type catalysts lead to high density polyethylene (PE-HD). PE-HD has a density of generally more than  $> 0.94 \text{ g/cm}^3$ . Example 3, page 27 uses a PE-HD of 0.965 and "Phillips" PE-HD is in any event prepared with a Chromium containing catalyst, the catalysis being a heterogenic catalysis. As a matter of fact "Phillips-Type catalyst" is used as a synonym for Chromium containing catalyst for historical reasons.

Besides the high density, this type of PE shows a high content of vinyl groups and a polydispersity ( $M_w/M_n$ ) of approximately 6.3 (see for example page 162 of enclosed document).

On the other hand "Metallocene Type" PE is PE-LLD, prepared with dicyclopentadienyl Zr or Ti derivatives. Aluminumalkyl compounds are used as co-catalysts or activators. The catalysis is typically a homogenous catalysis also called single site catalysis. The density of the product is lower than  $0.94 \text{ g/cm}^3$  and almost no double bonds remain in the polymer. The polydispersity ( $M_w/M_n$ ) of metallocene LLD-PE is approximately 2 (see for example page 163 of enclosed document).

From the above, there can be no doubt that PE produced with a "Phillips Type" catalyst (PE-HD) and PE produced with a "Metallocene Type" catalyst (PE-LLD) lead to significantly different polyethylene types with markedly different physical properties.

For the skilled person the reference in the claim to "Phillips Type" catalysis sets a clear line of demarcation to any other catalysis, in particular to "Metallocene Type" catalysis. A PE produced with a "Phillips Type" catalyst can therefore be easily distinguished from any other PE produced according to another catalysis, in particular produced according to "Metallocene Type" catalysis.

### **Claim Rejections**

Claims 1, 5 and 8-14 are rejected under 35 USC 103(a) as obvious over Niira, et al., U.S. Pat. No. 4,938,955.

Applicant respectfully rebuts these rejections.

The examiner is citing Niira for the first time. Niira's invention relates to an antibiotic resin composition comprising a zeolite, the ion-exchangeable ions of which are partially replaced by ammonium ions and antibiotic metal ions. A further component is a discoloration inhibitor selected from the group consisting of benzotriazole compounds, oxalic anilide compounds, salicylic acid compounds, cyanoacrylate compounds, benzophenone compounds, hindered amine compounds, sulfur compounds and hydrazine compounds (claim 1).

The resin may be a natural, semisynthetic or synthetic resin, such as for example given in claim 12.

The document is silent as to any specific combination of UV-absorbers. Furthermore for the technical problem solved by Niira, essentially all polymers (natural and synthetic) appear equally suitable (col 5, line 21 to 33). Consequently there is no single preferred polymer, such as for example polyethylene or polypropylene. A skilled person would never arrive at the instant invention on the basis of the disclosure of Niira alone or combined with another reference above. The mere fact that Niira discloses a list of so called discoloration inhibitors among which also UV-absorbers are mentioned cannot render the instant invention obvious.

Claims 1, 5 and 8-13 are rejected under 35 USC 102(b) as anticipated by or, in the alternative, under 35 USC 103(a) as obvious over JP '322.

Applicant respectfully traverses these rejections.

Claim 1 is limited to PE-HD produced by "Phillips Type" catalysis. As outlined above the type of catalyst determines the polyethylene properties and makes it distinguishable from each other. In particular there is a clear line of demarcation between PE-HD produced with a "Phillips Type" catalyst and PE-LLD produced with a "Metallocene Type" catalyst (see above). The instant invention is therefore clearly distinct from the disclosure of JP 9193322.

Applicant submits that the rejection under USC 102(b) should therefore be set aside.

Claims 1, 5 and 8-13 are rejected under 35 USC 103(a) as obvious over JP '322 in view of Birbaum '597.

Applicant respectfully traverses these rejections.

JP '322 is directed to a metallocene PE-LLD for coating pipes. One stabilization contains a benzophenone UVA, a benzotriazole UVA, a sterically hindered amine and a peroxide decomposer. There is no indication that the sole combination of UV-absorbers gives an unexpected (synergistic) improvement with respect to weatherability. Furthermore in all stabilizer formulations additional stabilizers with different mode of action are present. As already outlined above, the skilled person at the time of the priority date of the instant invention was always looking for an improvement by combining differently acting light stabilizers.

Birbaum discloses the combined use of hydroxyphenyl-triazine UV-absorbers with sterically hindered amines. This is a combination of differently acting light stabilizers, namely a UV-absorbing component, and a component, which interferes with propagating radical chains. Birbaum mentions amongst a variety of additives, which may be present in his invention (col. 40, line 48 to col. 42, line 60) also other UV-absorbers. However, there is no teaching within the disclosure of Birbaum, which would suggest certain combinations of UV-absorbers.

The skilled person with the knowledge of JP '322 and in view of Birbaum can get no motivation to arrive exactly at the very specific combinations of the instant invention, with the expectation of achieving a synergistic effect in polyolefins. There is totally missing the required expectation of success.

Claims 1, 5 and 8-14 are rejected under 35 USC 103(a) as being unpatentable over Birbaum '597, Niira '955, or Avar '396, alone, or in view of JP '322, Musser '165, Jollenbeck '345, WO '052 or Luethi '982.

For the Birbaum reference, Niira and JP 9193322, see above.

Avar et al. disclose novel benzotriazole UV-absorbers for polymers, which are substituted in the benzene ring. In col. 3 further additives, which may also be present are mentioned. The list is

starting with antioxidants, sulfur compounds, phosphorous compounds and ending with further UV-absorbers, sterically hindered amines flame retardants and antistatic agents. There is no mention of specific UV absorber combinations from which a synergistic stabilization effect could be expected. The skilled person can therefore get no motivation from the Avar disclosure to arrive exactly at the very specific combinations of the instant invention, in particular the combinations of individual UV-absorbers, which show a surprising synergistic effect in polyolefins. There is totally missing the required expectation of success.

Musser et al. disclose specific copolyesterether compositions, which are stabilized with a phenolic antioxidant, a UV-absorber and a sterically hindered amine. Musser describes suitable classes of UV-absorbers (col. 4 to 6), suitable antioxidants and also suitable sterically hindered amines. Musser is a typical example for what has been already outlined above. Those who were seeking to improve polymer properties in outdoor applications were looking for combinations of differently acting stabilizers (antioxidant, UVA, radical scavenger). The skilled person at that time was not even seriously contemplating sole combinations of UV-absorbers for improving weaterability of polymers.

Consequently there is no mention in the specification that a combination of UV-absorbers could have any additional stabilizing effect for these copolyesterethers. Since the invention is directed to specific copolyesterethers, other polymers are not even mentioned. Although example 25 discloses accidentally among other components a mixture of a benzotriazole and a benzylidene malonate UV-absorber, namely Cyasorb® UV-5411 (benzotriazole UVA), Tinuvin® 144 (phenolic antioxidant and sterically hindered amine), Weston® 618 (phosphite) and Cyasorb® UV-1988 (benzylidene-malonate) there is no teaching, which would have motivated the skilled person to combine exactly those UV-absorbers as claimed in the instant invention for polyolefins, with the expectation of getting superior exposure results. The fact that two different UV-absorbers are in the stabilizer formulation appears to be by pure chance.

The invention of Joellenbeck et al. is directed to a stable aqueous dispersion of a mixture of hydroxybenzophenone UV-absorbers and hydroxyphenylbenzotriazole UV-absorbers, which is useful for stabilizing colored polyester fibers. The UV-absorber dispersion is applied for example together with the dying process. It is obvious that textile applications belong to a completely different field compared to the stabilization of "Phillips type" high density polyethylene. There is therefore no

motivation for the skilled person to apply the mixtures of Joellenbeck, after removing the water, in "Phillips Type" PE-HD; there is totally lacking the required expectation of success.

WO97/39052 is directed to the stabilization of polyolefins by a combination of specific sterically hindered amines and a conventional UV-absorber. Again two classes of differently acting stabilizers are combined. As outlined above and demonstrated also by the disclosure of WO97/39052 this is the field where the technical and scientific community has seen chances for unexpected improvements.

Consequently there is no mention of the sole use of UV-absorbers in polyolefins. The document appears to be irrelevant in this respect.

Luethi et al. describe in 1970 for the first time the use of certain oxalic anilides as effective stabilizers for polymers. It is evident that this document does not mention any combined use with other classes of UV-absorbers. The document appears to be irrelevant in this respect.

Applicant submits that the cited references alone, or the cited combinations of references, do not render the present invention obvious.

## **Conclusion**

With the above amendments the present claims are clearly novel over the cited prior art. Likewise, the present claims are unobvious over the cited references and combinations of references, as the documents cited provide no motivation to use exactly the instant combinations of individual UV-absorbers in specific polyolefin substrates with the expectation of getting a synergistically improved weather resistance of the polyolefin substrate.

The instant invention discloses and exemplifies this synergistic effect for all claimed combinations. This is a surprising effect, which cannot be derived from the prior art.

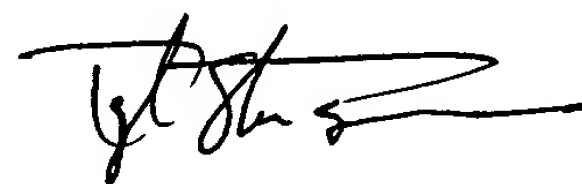
In view of the above discussion and the present amendments, Applicant submits that the 35 USC 102(b) and 35 USC 103(a) rejections are addressed and are overcome.

The Examiner is kindly requested to reconsider and to withdraw the present rejections.

Applicants submits that the present claims are in condition for allowance and respectfully request that they be found allowable.

Applicant notes that a Fourth Supplemental Information Disclosure Statement was mailed to the PTO January 24, 2003. A Fifth Supplemental Information Disclosure Statement was mailed January 22, 2004. The Examiner is kindly requested to indicate that the references cited therein are considered by returning and initialed copy of PTO form 1449.

Respectfully submitted,



Tyler A. Stevenson  
Agent for Applicants  
Reg. No. 46,388

Ciba Specialty Chemicals Corp.  
540 White Plains Road  
P.O. Box 2005  
Tarrytown, NY 10591-9005  
Tel. (914)785-2783  
Fax (914)785-7102

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